CLAIMS

What is claimed is:

1. A method for shutting down a drive employing a matrix converter during a power outage, with the matrix converter including a plurality of power input side commutation capacitors, a power input side switching unit, and a resistor unit, said method comprising the steps of:

in the event of a detected power outage, immediately opening the power input side switching unit to disconnect the matrix converter from the power supply,

connecting the resistor unit to input terminals of the matrix converter in such a way that an amplitude of a ~~measured~~ actual capacitor voltage space vector of the plurality of power input side commutation capacitors, and

regulating a ~~nominal~~ desired rotation speed value of the drive towards zero.

2. The method of claim 1, and further comprising the steps of forming from capacitor voltages, which are measured across the plurality of power input side commutation capacitors, two orthogonal voltage components of an actual capacitor voltage space vector, and smoothing the phase angle of the actual capacitor voltage space vector based on a nominal value of a power line frequency to determine from the two orthogonal voltage components the amplitude and phase angle of the actual capacitor voltage space vector.

3. The method of claim 1, and further comprising the steps of forming from measured phase voltages two orthogonal voltage components of an actual power line voltage space vector, transforming the orthogonal voltage components into polar components having an amplitude and phase angle, comparing the amplitude of the actual power line voltage space vector with a nominal amplitude value and initiating a switch from normal mode to braking mode based on a detected deviation, and smoothing the phase angle of the actual power line voltage space vector with a nominal value of the power line frequency.

4. The method of claim 2, and further comprising the steps of comparing the amplitude of the actual capacitor voltage space vector with ~~an~~ the amplitude of the actual power line voltage space vector before the outage to determine a deviation, and pulsing the resistor unit so that the deviation becomes zero.

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5. A method for shutting down a drive employing a matrix converter during a power outage, with the matrix converter including a plurality of power input side commutation capacitors, a power input side switching unit, and a resistor unit, said method comprising the steps of:

in the event of a detected power outage, immediately opening the power input side switching unit to disconnect the matrix converter from the power supply, and

controlling the matrix converter in braking mode in such a way that an amplitude of a voltage across the resistor unit is a maximum.

6. The method of claim 5, and further comprising the step of adjusting the amplitude of the voltage across the resistor unit by rotating a measured actual capacitor voltage space vector.

7. The method of claim 5, and further comprising the steps of forming from measured phase voltages two orthogonal voltage components of an actual power line voltage space vector, transforming the orthogonal voltage components into polar components having an amplitude and phase angle, comparing the amplitude of the actual power line voltage space vector with a nominal amplitude value and initiating a switch from normal mode to braking mode based on a detected deviation, and smoothing the phase angle of the actual power line voltage space vector with a nominal value of the power line frequency.

8. The method of claim 5, and further comprising the steps of forming from capacitor voltages measured across the plurality of power input side commutation capacitors two orthogonal voltage components of an actual capacitor voltage space vector, transforming the orthogonal voltage components into polar components, and comparing the amplitude of the actual capacitor voltage space vector with a nominal amplitude value to determine a deviation, and rotating the actual capacitor voltage space vector so that the deviation becomes zero.

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9. A device for shutting down a drive employing a matrix converter during a power outage, wherein the matrix converter includes a controller, a plurality of power input side commutation capacitors, a power input side switching unit, and a resistor unit, said device comprising:

a first unit for measuring an actual capacitor voltage space vector,

a second unit for measuring an actual power line voltage space vector,

a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with an amplitude output of the second unit, and an output which is connected with a control input of the resistor unit,

a power line voltage monitoring device having an input which is connected with an amplitude output of the second unit, and an output which is connected with a control input of the power input side switching unit,

a sequence controller having an input which is connected with the power line voltage monitoring device, and

a switch having a control input connected to the output of the power line voltage monitoring device, and an output connected via a ramp generator with a ~~nominal value~~ setpoint input of a rotation speed control circuit of the controller of the matrix converter.

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10. The device of claim 9, wherein the resistor unit comprises a series connection formed of a turn-off semiconductor switch and a resistor and having two terminals, and further comprising a plurality of diodes of which a first subset is connected with a first polarity between one terminal of the series connection and respective phase lines of the matrix converter, and a second subset is connected with an opposite polarity between the other terminal of the series connection and the respective phase lines of the matrix converter.

11. The device of claim 9, wherein the first unit comprises a coordinate transformer with a vector rotator connected downstream.

12. The device of claim 9, wherein the second unit comprises two coordinate converters connected in series.

13. The device of claim 9, and further comprising a smoothing device connected downstream of the amplitude output of the first unit.

14. The device of claims 9, and further comprising a vector phase control circuit connected downstream of the phase angle output of the second unit.

15. The device of claim 9 in the form of a signal processor.

16. A device for shutting down a drive employing a matrix converter during a power outage, wherein the matrix converter includes a controller, a plurality of power input side commutation capacitors, a power input side switching unit, and a resistor unit, said device comprising:

a first unit for measuring an actual capacitor voltage space vector,

a second unit for measuring an actual power line voltage space vector,

a third unit for measuring an actual power line current space vector,

a voltage control circuit having an input connected to an amplitude output of the first unit and with another input connected to an amplitude output of the second unit, and an output connected via a first switch with a control input of a control unit of the controller of the matrix converter,

a second switch having an output connected via a ramp generator with a ~~nominal value~~ setpoint input of a rotation speed control circuit of the controller of the matrix converter, 11.12.03

a power line voltage monitoring device having an input connected with an amplitude output of the second unit, and

a sequence controller having an input connected with the power line voltage monitoring device and an output connected with control inputs of the first and second switches.

17. The device of claim 16, wherein the resistor unit comprises three resistors, a turn-off semiconductor switch and a plurality of diodes, and wherein each of the resistors is connected, on one hand, with a corresponding phase line of the matrix converter and, on the other hand, via a diode of a first polarity to a first terminal of the turn-off semiconductor switch, and via another diode of a second polarity to a second terminal of the turn-off semiconductor switch.

18. The device of claim 16, wherein the resistor unit comprises a series connection of a resistor and a contactor.

19. The device of claim 16, wherein the first unit comprises a coordinate transformer with a vector rotator connected downstream.

20. The device of claim 16, wherein the second unit comprises two coordinate converters connected in series.

21. The device of claim 16, and further comprising a smoothing device connected downstream of the amplitude output of the first unit.

22. The device of claims 16, and further comprising a vector phase control circuit connected downstream of the phase angle output of the second unit.

23. The device of claim 16 in the form of a signal processor.

24. A controller for a matrix converter device capable of safely shutting down a drive during a power outage, comprising:

a plurality of power input side commutation capacitors,

a power input side switching unit connected between the power supply and the commutation capacitors,

a resistor unit,

a first unit for measuring an actual capacitor voltage space vector,

a second unit for measuring an actual power line voltage space vector,

a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with an amplitude output of the second unit, and an output which is connected with a control input of the resistor unit,

a power line voltage monitoring device having an input which is connected with an amplitude output of the second unit, and an output which is connected with a control input of the power input side switching unit,

a sequence controller having an input which is connected with the power line voltage monitoring device, and

a switch having a control input connected to the output of the power line voltage monitoring device, and an output connected via a ramp generator with a ~~nominal value~~ setpoint input of a rotation speed control circuit of the controller of the matrix converter.

25. A controller for a matrix converter device capable of safely shutting down a drive during a power outage, comprising:

a plurality of power input side commutation capacitors,

a power input side switching unit connected between the power supply and the commutation capacitors,

a resistor unit,

a first unit for measuring an actual capacitor voltage space vector,

a second unit for measuring an actual power line voltage space vector,

a third unit for measuring an actual power line current space vector,

a voltage control circuit having an input connected to an amplitude output of the first unit and with another input connected to an amplitude output of the second unit, and an output connected via a first switch with a control input of a control unit of the controller of the matrix converter,

a second switch having an output connected via a ramp generator with a ~~nominal value~~ setpoint input of a rotation speed control circuit of the controller of the matrix converter, 11.12.03

a power line voltage monitoring device having an input connected with an amplitude output of the second unit, and

a sequence controller having an input connected with the power line voltage monitoring device and an output connected with control inputs of the first and second switches.